NEBRASKA NATURAL RESOURCES COMMISSION

Water Sustainability Fund

Application for Funding

Section A.

ADMINISTRATIVE

PROJECT NAME: Statewide Weather Monitoring for Nebraska

PRIMARY CONTACT INFORMATION

Entity Name: –Board of Regents of the University of Nebraska for the University of Nebraska-Lincoln

Contact Name: Martha Shulski

Address: 3310 Holdrege Street, Lincoln, NE 68583-0931

Phone: 402-472-6711

Email: mshulski3@unl.edu

Partners / Co-sponsors, if any: Click here to enter text.

1. Dollar amounts requested: (Grant, Loan, or Combination)

   Grant amount requested. $ 153,453

   Loan amount requested. $ 0.00

   If Loan, how many years repayment period? N/A

   If Loan, supply a complete year-by-year repayment schedule.
   N/A

2. Permits Needed - Attach copy for each obtained (N/A = not applicable)

Nebraska Game & Parks Commission (G&P) consultation on Threatened and Endangered Species and their Habitat	N/A☒	Obtained: YES☐ NO☐

Surface Water Right	N/A☒	Obtained: YES☐	NO☐
USACE (e.g., 404 Permit)	N/A☒	Obtained: YES☐	NO☐
Cultural Resources Evaluation	N/A☒	Obtained: YES☐	NO☐
Other (provide explanation below)	N/A☒	Obtained: YES☐	NO☐

Click here to enter text.

3. Are you applying for funding for a combined sewer over-flow project?

   YES☐ NO☒

   If yes, do you have a Long Term Control Plan that is currently approved by the Nebraska Department of Environmental Quality?

   YES☐ NO☒

   If yes attach a copy to your application. N/A

   If yes what is the population served by your project? N/A

   If yes provide a demonstration of need. N/A

   If yes and you were approved for funding in the most recent funding cycle, then resubmit the above information updated annually but you need not complete the remainder of the application.

4. If you are or are representing an NRD, do you have an Integrated Management Plan in place, or have you initiated one?

   N/A☒ YES☐ NO☐

5. Has this application previously been submitted for funding assistance from the Water Sustainability Fund and not been funded?

   YES☐ NO☒

   If yes, have any changes been made to the application in comparison to the previously submitted application? N/A

   If yes, describe the changes that have been made since the last application. N/A

   No, I certify the application is a true and exact copy of the previously submitted and scored application. (Signature required) N/A

6. Complete the following if your project has or will commence prior to next July 1st.

As of the date of submittal of this application, what is the Total Net Local Share of Expenses incurred for which you are asking cost share assistance from this fund? $ N/A

Attach all substantiating documentation such as invoices, cancelled checks etc. along with an itemized statement for these expenses. N/A

Estimate the Total Net Local Share of Expenses and a description of each you will incur between the date of submittal of this application and next July 1st for which you are asking cost share assistance from this fund.
$ N/A

Section B.

DNR DIRECTOR'S FINDINGS

Does your project include physical construction (defined as moving dirt, directing water, physically constructing something, or installing equipment)?

YES☐ NO☒

1(a). If yes (structural), submit a feasibility report (to comply with Title 261, CH 2) including engineering and technical data and the following information:

A discussion of the plan of development (004.01 A);
N/A

A description of all field investigations made to substantiate the feasibility report (004.01 B); N/A

Maps, drawings, charts, tables, etc., used as a basis for the feasibility report (004.01 C); N/A

A description of any necessary water and land rights and pertinent water supply and water quality information, if appropriate (004.01 D);
N/A

A discussion of each component of the final plan including, when applicable (004.01 E);

Required geologic investigation (004.01 E 1); N/A

Required hydrologic data (004.01 E 2); N/A

Design criteria for final design including, but not limited to, soil mechanics, hydraulic, hydrologic, structural, embankments and foundation criteria (004.01 E 3). N/A

1(b). If no (non-structural), submit data necessary to establish technical feasibility including, but not limited to the following (004.02):

The monitoring of weather conditions across Nebraska will be performed at existing stations within the Nebraska Mesonet (mesonet.unl.edu). The Mesonet represents a monitoring program at the University of Nebraska Lincoln that was established in 1981. The Mesonet was one of the nation's first automated state weather networks in the U.S. It was initially geared toward agricultural production applications but has grown and developed over time to serve a multitude of needs. Five stations were initially installed and the current number of stations is 64 throughout the state

(Figure 1). Instrumentation is commercial-grade or higher (i.e. Campbell Scientific or similar) and follows manufacturer recommendations for calibrations, which are performed in-house by trained personnel. Calibrations have been performed on site since the mid-1990s and follows the individual manufacturers recommendations. A robust inventory is kept at the Nebraska Mesonet. Each component either in the field, laboratory, or storage is catalogued and readily accessible by Mesonet staff. This allows for an easy and quick metadata reference for use in troubleshooting, keeping track of calibration dates, knowing when to phase out sensors, as well as conforming to state statute on appropriate tracking of inventory. Another key piece of metadata is a photo history. Digital photographs are taken of each station and the surrounding landscape approximately every 5 years. Over time, these records have been found to be beneficial in the event that any questions arise over the station microclimate and tracking land cover / land use change over time. Through the life of the Nebraska Mesonet, there has been good continuity and institutional knowledge in maintenance and calibration practices, with only a total of three full-time (non-overlapping) staff. Since the network's inception, one staff person has handled all maintenance activities. To date, each station is visited by the Mesonet technician on an annual basis for scheduled maintenance activities. If any data issues, sensor failures, etc. arise, however, a station may be visited more than once per year to resolve these. Station design utilizes a popular and proven tripod configuration in which sensors are mounted at specific heights on the tripod (Figure 2). No concrete or footings are needed. The footprint for the stations is 84 square meters. Placement of the temperature and humidity probe is in a non-aspirated gill shield and is 2m above ground level. The tipping bucket rain gage is situated 3 to 4m from the tripod. Bare soil temperature is observed at the 10cm depth and the sensor is located within a 1m x 1m box typically situated 1 to 2m from the station base. Soil moisture equipment is placed 2 to 3m away from the station base at a 135° angle, at the depths of 5cm, 10cm, 20cm, 50cm, and 100cm. These sensors are installed by trenching down 1m, leaving an undisturbed end wall, from which samples are taken and the probes are inserted to maintain the integrity of the soil column. Many stations incorporate the use of a fence at a distance of 4 to 5m around the station, which is primarily to prevent animal intrusions. The most effective and efficient fence types appear to be six 3.6m 'cattle panels' mounted on wooden fence posts. The stations are solar powered and communication is achieved via cell phone modem.

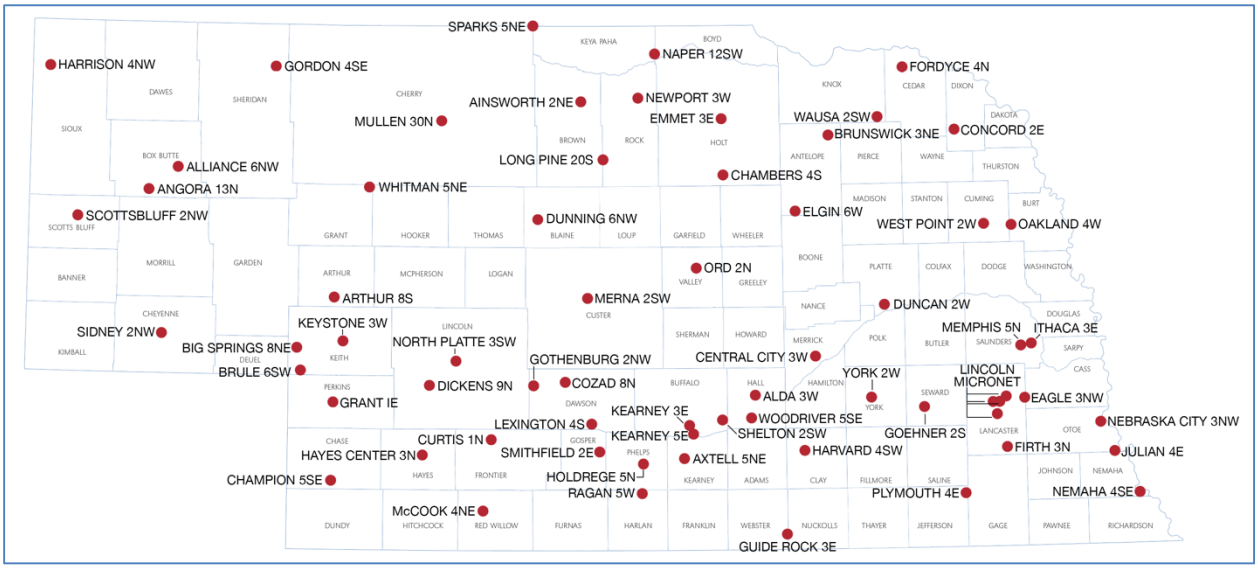

Figure 1: Locations of Nebraska Mesonet weather stations.

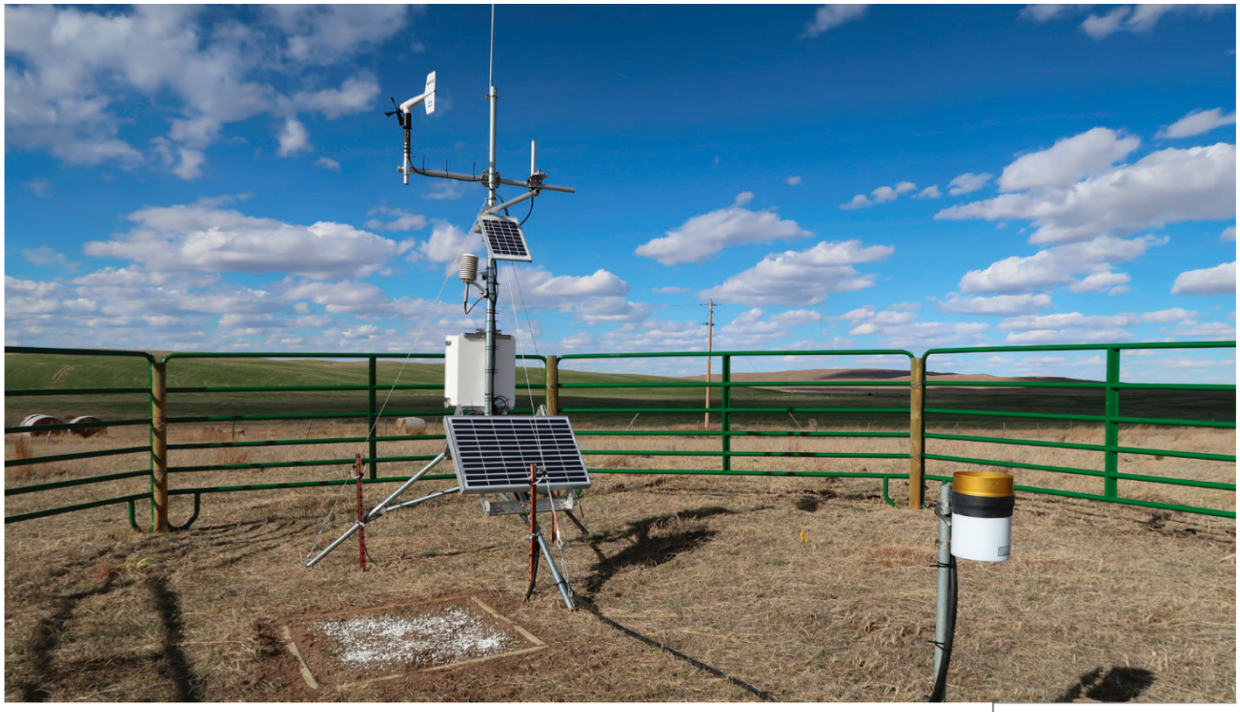

Figure 2: Weather station design illustrating tripod configuration with mounted sensors, solar panels, data logging equipment, and fencing. Station is located near Arthur, Nebraska.

A discussion of the plan of development (004.02 A);

Observations of air temperature, relative humidity, liquid precipitation, barometric pressure, incoming solar radiation, wind speed, wind direction, soil temperature (under bare soil at the four-inch depth), and soil moisture (under grass at four discrete depths) are collected, managed and distributed by Nebraska Mesonet personnel. Data are collected on a 5-minute basis with modern data loggers. These data are downloaded from each station over the internet via cell modem every 20 minutes. Following download, the data are maintained in raw flat file form, as well as decoded and inserted into a Relational Database Management System (RDBMS). From the RDBMS, data is then used to calculate summaries, derive parameters, and create graphics and tables where are disseminated to the stakeholders of Nebraska via the Nebraska Mesonet website, Twitter, and direct email distribution. These products include summarizations of hourly and daily data, calculated parameters such as heat index, wind chill index, potential evapotranspiration, growing degree days.

A description of field or research investigations utilized to substantiate the project conception (004.02 B);

The weather stations and subsequent management of the existing physical assets follows a methodology originally formulated 1981, and updated with current observational practices. Initially designed for agricultural purposes, the network has continually utilized state of the art equipment suited for this application. Equipment and observation practices have evolved over time in order to keep current with technological advances in instrumentation, datalogging, and communications. The project team is an active member in a working group of state weather network operators that determine and set best management practices for environmental monitoring. This working group is within an Association of State Climatologists – a national organization of weather and climate service providers. Current practices are such that each Nebraska weather station receives an annual on-site visit for manual quality checks. Furthermore, each sensor on the weather station is calibrated either in house or at a laboratory facility according to the manufacturer recommendations.

A description of the necessary water and/or land rights, if applicable (004.02 C);

N/A.

A discussion of the anticipated effects, if any, of the project upon the development and/or operation of existing or envisioned structural measures including a brief description of any such measure (004.02 D).

No effects are expected.

2. Provide evidence that there are no known means of accomplishing the same purpose or purposes more economically, by describing the next best alternative.

The observations and associated data products and services from the Nebraska Mesonet are not able to be obtained by another means for the given cost. The suite of weather data and quality of the observations from these stations are unique to this network. The best alternative is to contract with a private company to install basic weather stations. However, such an alternative has operational issues in that basic weather stations are not kept calibrated, often fall into disrepair due to the hobbyist nature of the intended resale audience, and are thus not reliable in providing a consistent and thorough record from which to describe long-term weather patterns.

3. Document all sources and report all costs and benefit data using current data, (commodity prices, recreation benefit prices, and wildlife prices as prescribed by the Director) using both dollar values and other units of measurement when appropriate (environmental, social, cultural, data improvement, etc.). The period of analysis for economic feasibility studies shall be fifty (50) years or with prior approval of the Director, up to one hundred (100) years [T261 CH 2 (005)].

   - Describe any relevant cost information including, but not limited to the engineering and inspection costs, capital construction costs, annual operation and maintenance costs, and replacement costs. Cost information shall also include the estimated construction period as well as the estimated project life (005.01). Operation of the network includes salary support for staff that maintain the weather observing stations, calibrate all equipment and perform site visits. Support is also required for a manager who handles weather station contracts, provides data quality control, archives and disseminates data, and develops data products. A communications associate provides summary information for Mesonet data and delivers information to the public. Operation of the individual stations cost $2,600 per station per year.
   - Only primary tangible benefits may be counted in providing the monetary benefit information and shall be displayed by year for the project life. In a multi-purpose project, estimate benefits for each purpose, by year, for the life of the project. Describe any intangible or secondary benefits separately. In a case where there is no generally accepted method for calculation of primary tangible benefits describe how the project will increase water sustainability, such that the economic feasibility of the project can be approved by the Director and the Commission (005.02). The project will provide the DNR and other agencies and offices high quality, long-term observations of weather and climate across Nebraska. The accurate and timely measurements of precipitation and soil moisture, in particular, will lead to a more precise understanding of Nebraska's water resources. This information can be used as input and/or verification for water modeling studies, provide an indication of crop water use and irrigation requirements, inform interstate water compacts, inform the U.S. Drought Monitor and

aid in natural resource management decisions at various spatial scales.

- All benefit and cost data shall be presented in a table form to indicate the annual cash flow for the life of the proposal, not to exceed 100 years (005.03). N/A
- In the case of projects for which there is no generally accepted method for calculation of primary tangible benefits and if the project will increase water sustainability, the economic feasibility of such proposal shall be demonstrated by such method as the Director and the Commission deem appropriate (005.04). No generally accepted method currently exists to calculate tangible benefits across the user sectors of the weather data and information.

4. Provide evidence that sufficient funds are available to complete the proposal.

Funding augmentation from sources outside of this proposal include two primary sources. The program receives $107,000 from the University of Nebraska Institute of Agriculture and Natural Resources to support the Nebraska Mesonet operations and support staff. Revenue from sponsorship of individual stations currently totals $132,600. This includes $59,800 in support from University of Nebraska entities. Combined, these two funding streams provide support of the program in the amount of $239,600. In addition, the Nebraska Department of Natural resources has committed $75,000 for FY18.

5. Provide evidence that sufficient annual revenue is available to repay the reimbursable costs and to cover OM&R (operate, maintain, and replace). N/A

6. If a loan is involved, provide sufficient documentation to prove that the loan can be repaid during the repayment life of the proposal.

N/A.

7. Describe how the plan of development minimizes impacts on the natural environment.

The weather station footprint is the minimum necessary to accurately measure the environmental variables. If a station needs to be removed, all equipment is taken and nothing is left on-site. Stations are powered by solar energy, which further reduces any negative environmental impact.

8. Explain how you are qualified, responsible and legally capable of carrying out the project for which you are seeking funds.

This network has been maintained by the University of Nebraska – Lincoln since it's inception in 1981. The current project participants have managed and operated the state weather network since 2009. There is a documented protocol for all activities related to the network, including: locating a new weather station, installing a new station, maintenance of the stations, calibration of all sensors, data capture and archival, data quality control, and data archival and distribution. This protocol follows standards and practices of agreed upon and utilized by other state weather networks, or mesonets, across the United States.

9. Explain how your project considers plans and programs of the state and resources development plans of the political subdivisions of the state.

The Nebraska State Climate Office is forming an advisory board of users and decision makers from State, Federal, and local political subdivisions, along with private industry, to guide the Nebraska Mesonet operations to the best benefit of all Nebraska stakeholders. The board will meet on a semi-annual basis and members are currently being contacted. The Nebraska State Climate Office Director will serve as the lead for the board.

10. Are land rights necessary to complete your project?

    YES☐ NO☒

    If yes, provide a complete listing of all lands involved in the project.
    N/A

    If yes, attach proof of ownership for each easements, rights-of-way and fee title currently held.
    N/A

    If yes, provide assurance that you can hold or can acquire title to all lands not currently held.
    N/A

11. Identify how you possess all necessary authority to undertake or participate in the project.

The Nebraska Mesonet represents a program that is operated by the Nebraska State Climate Office within the Institute of Agriculture and Natural Resources at the University of Nebraska – Lincoln. University faculty and staff began operation of this network in 1981 through federal grants. UNL leadership has tasked the State Climate Office with the state weather monitoring program. Current mesonet operators are UNL faculty and staff with the educational background, employment history, and qualifications to manage such a project.

12. Identify the probable environmental and ecological consequences that may result as the result of the project.

There are no known negative consequences expected as a result of this project. The history of the work illustrates that no unwanted or unexpected consequences have arisen due to the project. In fact, the data from the Nebraska Mesonet has been used to facilitate protections and appropriate administration of Nebraska resources.

Section C.

NRC SCORING

In the NRC's scoring process, points will be given to each project in ranking the projects, with the total number of points determining the final project ranking list.

The following 15 criteria constitute the items for which points will be assigned. Point assignments will be 0, 2, 4, or 6 for items 1 through 8; and 0, 1, 2, or 3 for items 9 through 15. Two additional points will be awarded to projects which address issues determined by the NRC to be the result of a federal mandate.

Notes:

- The responses to one criterion *will not* be considered in the scoring of other criteria. Repeat references as needed to support documentation in each criterion as appropriate. The 15 categories are specified by statute and will be used to create scoring matrixes which will ultimately determine which projects receive funding.

- There is a total of 69 possible points, plus two bonus points. The potential number of points awarded for each criteria are noted in parenthesis. Once points are assigned, they will be added to determine a final score. The scores will determine ranking.

- The Commission recommends providing the requested information and the requests are not intended to limit the information an applicant may provide. An applicant should include additional information that is believed will assist the Commission in understanding a proposal so that it can be awarded the points to which it is entitled.

Complete any of the following (15) criteria which apply to your project. Your response will be reviewed and scored by the NRC. Place an N/A (not applicable) in any that do not apply, an N/A will automatically be placed in any response fields left blank.

1. Remediates or mitigates threats to drinking water;

    - Describe the specific threats to drinking water the project will address.
    - Identify whose drinking water, how many people are affected, how will project remediate or mitigate.
    - Provide a history of issues and tried solutions.
    - Provide detail regarding long range impacts if issues are not resolved.

The project does not directly remediate or mitigate threats to drinking water. The weather and climate observations taken by the network help determine the quantity of water availability. This is done by direct measurements of liquid precipitation, soil

moisture at four levels in the soil profile, and the derived parameter evapotranspiration. Each of these metrics are made publicly available for DNR and other agencies and individuals to utilize in determinations of water quality in the various sytems.

2. Meets the goals and objectives of an approved integrated management plan or ground water management plan;

    - Identify the specific plan that is being referenced including date, who issued it and whether it is an IMP or GW management plan.
    - Provide the history of work completed to achieve the goals of this plan.
    - List which goals and objectives of the management plan the project provides benefits for and how the project provides those benefits.

Weather and climate data are of paramount importance to any integrated water management plan or groundwater management plan. It is in the improved understanding of precipitation, soil water, and plant water use that the Mesonet data and data products are of value.

3. Contributes to water sustainability goals by increasing aquifer recharge, reducing aquifer depletion, or increasing streamflow;

    List the following information that is applicable:

    - The location, area and amount of recharge;
    - The location, area and amount that aquifer depletion will be reduced;
    - The reach, amount and timing of increased streamflow. Describe how the project will meet these objectives and what the source of the water is;
    - Provide a detailed listing of cross basin benefits, if any.

    N/A

4. Contributes to multiple water supply goals, including, but not limited to, flood control, agricultural use, municipal and industrial uses, recreational benefits, wildlife habitat, conservation of water resources, and preservation of water resources;

    - List the goals the project provides benefits.
    - Describe how the project will provide these benefits
    - Provide a long range forecast of the expected benefits this project could have versus continuing on current path.

The Nebraska Mesonet provides an accurate representation of the precipitation that has fallen across Nebraska, with emphasis on runoff potential from rains over already saturated ground, as well as mitigating drought by appropriately managing reservoir drawdown. These benefits directly extend into flood control, conservation of water resources, and the preservation of water resources.

5. Maximizes the beneficial use of Nebraska's water resources for the benefit of the state's residents;

   - Describe how the project will maximize the increased beneficial use of Nebraska's water resources.
   - Describe the beneficial uses that will be reduced, if any.
   - Describe how the project provides a beneficial impact to the state's residents.

The Nebraska Mesonet represents a network of 64 high-quality, research-grade observational stations of weather variables across the state on a real-time basis. Measurements of precipitation, air temperature, humidity, soil temperature, soil moisture, solar radiation, wind speed and direction and barometric pressure are taken each hour. Accurate observations of precipitation and soil moisture, in particular, are beneficial to proper management of Nebraska's water resources and documenting water quantity. The Mesonet currently partners with 10 Natural Resource Districts in Nebraska for this weather data collection and provides each NRD with localized observations required for their respective water management decisions. In addition to the aforementioned observations, the State Climate Office develops and delivers data products used in water management decisions. Evapotranspiration is calculated on a daily basis and delivered to the user community. This information is invaluable for crop water management decisions made by producers, crop consultants, University Extension, etc. This translates into a direct benefit to the state's residents by giving them tools for managing irrigation, managing urban and suburban water use, as well as rural water retention for release during dry or drought conditions.

6. Is cost-effective;

   - List the estimated construction costs, O/M costs, land and water acquisition costs, alternative options, value of benefits gained.
   - Compare these costs to other methods of achieving the same benefits.
   - List the costs of the project.
   - Describe how it is a cost effective project or alternative.

   N/A

7. Helps the state meet its obligations under interstate compacts, decrees, or other state contracts or agreements or federal law;

   - Identify the interstate compact, decree, state contract or agreement or federal law.
   - Describe how the project will help the state meet its obligations under compacts, decrees, state contracts or agreements or federal law.
   - Describe current deficiencies and document how the project will reduce deficiencies.

Observations collected by the Nebraska Mesonet are used for managing water resources specific to the Kansas-Nebraska-Colorado Republican River Compact of 1943, the Nebraska-Colorado South Platte River Compact of 1923, and the Nebraska-Kansas Blue River Compact of 1971 to name three major agreements that require surface precipitation measurements to accurately portray stream flow or augmentation within Nebraska borders. Using the Kansas-Nebraska-Colorado Republican River Compact as an example, the liquid rainfall measurements within the Republican watershed provides the local NRD with background for well drilling and flood irrigation allocation assessments. There is a need for more observations in these watersheds, however, and providing funding to grow the Nebraska Mesonet will provide a better understanding of the recharge capability of groundwater, as well as surface water availability from precipitation.

8. Reduces threats to property damage or protects critical infrastructure that consists of the physical assets, systems, and networks vital to the state or the Untied States such that their incapacitation would have a debilitating effect on public security or public health and safety;

    - Identify the property that the project is intended to reduce threats to.
    - Describe and quantify reductions in threats to critical infrastructure provided by the project and how the infrastructure is vital to Nebraska or the United States.
    - Identify the potential value of cost savings resulting from completion of the project.
    - Describe the benefits for public security, public health and safety.

There is not a direct reduction in threat to property damage as a result of the weather monitoring network. However, there are several notable indirect benefits of the data and products. Currently, Mesonet data are used to inform authors of the U.S. Drought Monitor. A better understanding of drought conditions, particularly on a local level, leads to a more accurate depiction of dryness and drought. An understanding of severity and length of historical droughts are captured in the U.S. Drought Risk Atlas, a nation-wide product of the National Drought Mitigation Center. This drought record is important information for infrastructure design and risk assessment for damage during extreme dry periods and loss of soil profile integrity. Infrastructure damage was felt during the 2012 drought as a result of the extremely dry soil conditions. An understanding of the occurrence of the various drought categories across Nebraska is therefore of importance as it relates to property and infrastructure.

Mesonet data are also useful in assessing the frequency and severity of heavy precipitation events, particularly rainfall. Infrastructure design is often based in part on threats to severe and high impact weather events. High rainfall often occurs during convective events that can be highly localized. As such, it is more advantageous to have a high number of weather stations such that these events can be observed. The Mesonet provides 64 discrete locations at which rainfall can be documented. Because

the stations report data on a 5-minute basis, heavy downpour events that are high impact to property and infrastructure can be monitored.

9. Improves water quality;

    - Describe what quality issue(s) is/are to be improved.
    - Describe and quantify how the project improves water quality, what is the target area, what is the population or acreage receiving benefits, what is the usage of the water: residential, industrial, agriculture or recreational.
    - Describe other possible solutions to remedy this issue.
    - Describe the history of the water quality issue including previous attempts to remedy the problem and the results obtained.

The Nebraska Mesonet does not directly measure water quality. However, water quality and quantity are closely linked. By providing data and products that help inform water management decisions, this program indirectly impacts water quality in Nebraska. The most relevant decisions influenced are those related to irrigation management and sustainable and efficient use of water.

10. Has utilized all available funding resources of the local jurisdiction to support the program, project, or activity;

    - Identify the local jurisdiction that supports the project.
    - List current property tax levy, valuations, or other sources of revenue for the sponsoring entity.
    - List other funding sources for the project.

A total of ten Natural Resource Districts contract with UNL to support specific stations in the Nebraska Mesonet weather monitoring program. This amount totals $49,400 annually. Other funding for specific weather stations in the program, on an annual basis, are as follows: UNL - $59,800; Private industry: $15,600; Municipal: $7,800. The sum total of station client funding is $132,600.

11. Has a local jurisdiction with plans in place that support sustainable water use;

    - List the local jurisdiction and identify specific plans being referenced that are in place to support sustainable water use.
    - Provide the history of work completed to achieve the goals of these plans.
    - List which goals and objectives this project will provide benefits for and how this project supports or contributes to those plans.
    - Describe and quantify how the project supports sustainable water use, what is the target area, what is the population or acreage receiving benefits, what is the usage of the water: residential, industrial, agriculture or recreational.
    - List all stakeholders involved in project.
    - Identify who benefits from this project.

N/A

12. Addresses a statewide problem or issue;

- List the issues or problems addressed by the project and why they should be considered statewide.
- Describe how the project will address each issue and/or problem.
- Describe the total number of people and/or total number of acres that would receive benefits.
- Identify the benefit, to the state, this project would provide.

Weather observations from this monitoring network will aid in a variety of surface and groundwater management decisions on both a basin and statewide level. The spatial coverage of the stations is such that many areas of Nebraska are represented. Decision-making on issues related to surface water quantity, groundwater recharge, crop water use and irrigation management, and drought mitigation will benefit from the real-time and historical observations collected by the network. Data of direct relevance and importance for these decisions include: precipitation rates; daily, monthly, seasonal and annual precipitation amounts; soil moisture levels; and evapotranspiration rates. Information from the network inform the U.S. Drought Monitor author in identifying the specific location and severity of dryness or drought.

13. Contributes to the state's ability to leverage state dollars with local or federal government partners or other partners to maximize the use of its resources;

- List other funding sources or other partners, and the amount each will contribute, in a funding matrix.
- Describe how each source of funding is made available if the project is funded.
- Provide a copy or evidence of each commitment, for each separate source, of match dollars and funding partners.
- Describe how you will proceed if other funding sources do not come through.

	Funding Amount	
Source	Year 1	Year 2
Nebraska DNR	$75,000.00	unknown
University of Nebraska	$107,000.00	$107,000.00
University of Nebraska Mesonet station client fees	$59,800.00	$59,800.00
External Mesont station client fees	$78,000.00	$78,000.00
Water Sustainability Fund	$76,250.00	$77,203.00
Total Project Costs	$396050	$322003
Net total local project costs	$154,250	$155203

Nebraska DNR has committed $75,000 for FY 18 to support Nebraska Mesonet operations through Contract #833 with the University of Nebraska Institute of Agriculture and Natural Resources. The University of Nebraska Institute of Agriculture and Natural Resources has committed $107,000 in support, which began in January, 2016. An email confirmation from the IANR Associate Vice Chancellor stating their commitment is included in the Appendix. University of Nebraska and External Mesonet station client fees have all been paid for FY 2018. Each client has signed a 5-year contract with the University of Nebraska for data services to support specific monitoring stations. An example contract for Central Platte Natural Resource District is included in the Appendix. External client fees in the amount of $78,000 includes all Natural Resource District, private company, and municipal station sponsors. *This amount accounts for the 40% cost match to qualify for this fund.*

Funds are being sought after by a private company for a 'data buy' of Mesonet data. Currently, a contract is being negotiated in which $20,000 of annual support could potentially be obtained.

14. Contributes to watershed health and function;

    - Describe how the project will contribute to watershed health and function in detail and list all of the watersheds affected.

The primary contribution to watershed function is through localized monitoring of weather conditions across Nebraska in each of the major watersheds. All of the Natural Resource Districts in the state are represented with at least one (or more) weather station(s). An understanding of rainfall, soil moisture, air temperature monitored by the network in addition to estimation of plant water use is of direct benefit to monitoring watershed function. These data lead to a general understanding of current and emerging climate conditions. Data is already incorporated into hydrologic modeling efforts of benefit to Nebraska watersheds, specific to balancing incoming water resources and projected runoff as determined from Nebraska Mesonet weather station observations and other surface monitoring networks, with outgoing needs such as maintaining critical streamflow, irrigation demands, recreational desires, and compact obligations. Specific entities that use the Nebraska Mesonet data to the benefit of the watershed under each of their domains includes all the Natural Resource Districts, Central Nebraska Public Power and Irrigation District, Nebraska Public Power District, Eastern Nebraska Water Resources Assessment, and the Conservation and Survey Division (Nebraska Geological Survey).

15. Uses objectives described in the annual report and plan of work for the state water planning and review process issued by the department.

    - Identify the date of the Annual Report utilized.

- List any and all objectives of the Annual Report intended to be met by the project
- Explain how the project meets each objective.

N/A

16. Federal Mandate Bonus. If you believe that your project is designed to meet the requirements of a federal mandate which furthers the goals of the WSF, then:

    - Describe the federal mandate.
    - Provide documentary evidence of the federal mandate.
    - Describe how the project meets the requirements of the federal mandate.
    - Describe the relationship between the federal mandate and how the project furthers the goals of water sustainability.

    N/A

Section D.

PROJECT DESCRIPTION

1. Overview

   In 1,000 characters *or less*, provide a brief description of your project including the nature and purpose of the project and objectives of the project.

The Nebraska State Climate Office at UNL manages and operates a statewide weather network – the Nebraska Mesonet. The purpose of the network is to provide a high-quality and unbiased set of environmental observations and associated data products to serve Nebraskans. The data and products are utilized by a variety of agencies, though primary uses focus on water management. Observations at 64 locations throughout the state include the following variables: air temperature and humidity, wind speed and direction, solar radiation, precipitation, soil moisture, and soil temperature. The network has a 36-history of observing Nebraska's weather conditions on an automated basis. Data products are developed from the observations, including evapotranspiration, for tracking crop water use. Both real-time and historical weather data and products informs decisions at various scales and primary users are the Nebraska Department of Natural Resources, Natural Resource Districts, Nebraska Extension, the Department of Agriculture, and the National Weather Service.

2. Project Tasks and Timeline

   Identify what activities will be conducted by the project. For multiyear projects please list what activities are to be completed each year.

The 2-year project will consist of continuous measurements of real-time weather observations of the aforementioned variables for identified locations around Nebraska. During each year of the project, real-time weather data will be collected by the Nebraska State Climate Office at the University of Nebraska. Observations will be taken every 5 minutes with the data downloaded every 20 minutes. The data will be quality controlled according to established protocol. Real-time data will be transferred to all necessary parties, including the DNR and all interested NRD's. Data will also be transferred to the High Plains Regional Climate Center for integration in historical record-keeping and regional/national context. The Nebraska State Climate Office will keep an up-to-date web presence at https://mesonet.unl.edu with access to real-time data and the previous day's information.

Each weather station will receive one site visit annually, at a minimum, to check all equipment. Sensors will be calibrated at the in-house laboratory according to manufacturer recommendations. An inventory of all sensors will be kept up to date and on file to track history and provide metadata for the program.

3. Partnerships

Identify the roles and responsibilities of agencies and groups involved in the proposed project regardless of whether each is an additional funding source. List any other sources of funding that have been approached for project support and that have officially turned you down. Attach the rejection letter.

The following agencies/offices are committed partners on the project by providing funding support for the identified number of weather observing stations. The agencies have signed a five-year contract with the University of Nebraska (in accordance with University Office of Procurement regulations) for operation of the stations and the associated data services. These contracts began in 2016.
- Central Nebraska Public Power and Irrigation District (3 stations)
- City of Lincoln (3 stations)
- Central Platte NRD (6 stations)
- Lower Platte South NRD (3 stations)
- Lower Elkhorn NRD, Lower Loup NRD, Lower Niobrara NRD, Lower Republican NRD, Tri-Basin NRD, Upper Big Blue NRD, Upper Republican NRD (1 station each)
- Institute of Agriculture and Natural Resources (13 stations)
- UNL Department of Agronomy and Horticulture (3 stations)
- UNL Panhandle Research and Extension Center (3 stations)
- UNL West Central Research and Extension Center (3 stations)
- UNL Northeast Research and Extension Center (1 station)
- UNL Barta Brothers Ranch (1 station)
- UNL School of Biological Science (1 station)
- UNL South Central Agronomy Laboratory (1 station)
- Diamond Hill Farms (2 stations)
- CSS Farms (1 station)

The National Oceanic and Atmospheric Administration receives Nebraska Mesonet data for use in weather forecasting applications and research efforts. The data are delivered to the Meteorological Assimilation Data Ingest System (MADIS) in a near real-time. Mesonet staff are currently negotiating a contract with a private weather firm (federally contract by NOAA) to purchase access to Mesonet data.

4. Other Sources of Funding

Identify the costs of the entire project, what costs each other source of funding will be applied to, and whether each of these other sources of funding is confirmed. If not, please identify those entities and list the date when confirmation is expected. Explain how you will implement the project if these sources are not obtained.

The funding requirements for the Nebraska Mesonet are outlined below. This includes a position yet to be hired – Mesonet Technician. This position will be in part funded by funds with a private weather firm as mentioned in the Partners section (3).

Position	Base Salary	Benefit rate	FTE	Subtotal
Mesonet Manager	$72,525.00	37%	1.0	$99,359.25
Senior Mesonet Technician	$66,227.00	28%	1.0	$84,770.56
Mesonet Technician	$41,000.00	28%	1.0	$52,480.00
Communications Associate	$43,673.00	40%	0.2	$11,200.00
Salary costs				$247,809.81
64 stations at $2,600 per station				$166,400.00
Sum Total for Nebraska Mesonet				$414,208.81

The funding amounts outlined here are the various sources of funding for the Nebraska Mesonet for Year 1 and Year 2.

	Funding Amount			
Source	Year 1		Year 2	
Nebraska DNR	$75,000.00	confirmed	unknown	
University of Nebraska	$107,000.00	confirmed	$107,000.00	confirmed
University of Nebraska Mesonet station client fees	$59,800.00	confirmed	$59,800.00	confirmed
External Mesont station client fees	$78,000.00	confirmed	$78,000.00	confirmed
Water Sustainability Fund	$76,250.00		$77,203.00	
National Mesonet Program	$20,000.00	under negotiation	$20,000.00	under negotiation
Sum Total	$416,050.00		$342,003.00	

5. Support/Opposition

Discuss both support and opposition to the project, including the group or interest each represents.

There are a wide variety of Mesonet data and product users. Primary users are the entities that sponsor specific stations in the network and are listed as Partners (section 3). They have identified needs for weather and climate monitoring that inform and enhance decision-making. Letters of support from the Nebraska Department of Agriculture, Nebraska Public Power District, Nebraska Indian Community College, Central Platte Natural Resource District, and Central Nebraska Public Power and Irrigation District can be found in the Appendix.

Subject: FW: NSCO Funding Augmentation
Date: Monday, July 31, 2017 at 12:17:06 PM Central Daylight Time
From: Martha Shulski

From: Ron Yoder <ryoder2@unl.edu>
Date: Monday, November 30, 2015 at 1:42 PM
To: Martha Shulski <mshulski3@unl.edu>
Cc: Charles Hibberd <hibberd@unl.edu>, John Carroll <jcarroll2@unl.edu>, Jeff Bassford <jbassford2@unl.edu>, Bryan Areman <bareman2@unl.edu>, Ronnie Green <rgreen2@unl.edu>
Subject: NSCO Funding Augmentation

Martha,

As we have discussed over the past several months, we are committed to supporting the Nebraska Mesonet at a level that makes it a reliable and sustainable network. We are committing the funding listed below for the current fiscal year (FY), as well as for FY 17 and FY 18. The salary commitments will be pro-rated for half of FY 16. We intend to continue support for the Mesonet, and will discuss our level of commitment with you prior to determining the amount of funding for FY 19 and following.

Please note that the funding for the soil moisture scientist salary is being provided by Dean Hibberd, who also committed to assigning 0.2 FTE of Tyler William's position to work with the NSCO. Tyler will continue to report to the District Director, and you will be asked for your feedback for his annual performance evaluation.

NSCO Funding

	FTE	**$**	
data manager	0.6	40,000	Cooper
administrative assistant	0.25	10,000	
mesonet operating funds	na	31,000	
communications specialist	0.25	8,000	
soil moisture scientist	0.25	18,000	to fund Eric Hunt's salary in cooperation with AER; extension commitment
	Total	107,000	

We will also continue to work closely with you to support your efforts to acquire additional funding support from other sources.

Thanks, and let me know if you have questions.

Ron

Ronald E. Yoder, Ph.D., P.E.
Associate Vice Chancellor
University of Nebraska
402-472-2871

UNIVERSITY OF NEBRASKA – LINCOLN

UNIVERSITY PROVIDED SERVICES AGREEMENT

This Agreement sets forth the terms between the **Central Platte NRD** ("the Undersigned"), having an address at **215 Kaufman Avenue, Grand Island, NE 68803**, and the Board of Regents of the University of Nebraska a public body corporate and governing body of the University of Nebraska-Lincoln ("the University") and its **Nebraska Mesonet**, of the **Nebraska State Climate Office** (the "NSCO"), having an address at **3310 Holdrege Street, Lincoln, NE 68583** with regard to the performance by the University of the services contemplated herein.

RECITALS

WHEREAS, the Undersigned desires to obtain the services of the University; and

WHEREAS, the University claims to have expertise and experience to provide such services for the Undersigned;

THEREFORE, the University and the Undersigned hereby agree to the following terms, obligations and conditions:

1. Description of Services. The University agrees to use its best efforts to render the services and provide the deliverables identified in Section 1 of Exhibit A to this Agreement (the "Services"), attached hereto and incorporated by reference herein, to the Undersigned.

2. Payment. In full consideration for the Services performed by the University under this Agreement, the Undersigned shall pay or cause to be paid to the University the sum identified in Section 2 of Exhibit A to this Agreement, attached hereto and incorporated by reference herein, and upon submission of an invoice to Undersigned by the University. The University shall invoice the Undersigned for the sums set forth in Exhibit A on a net 90 basis.

3. Term. The Services to be performed by the University under this Agreement shall start no later than **1 July 2016** and shall be completed no later than **30 June 2021**; provided, however, the term may be extended upon mutual agreement of the parties.

4. Confidentiality. The University agrees to use the same degree of care it uses to protect its own confidential information and, to the extent permitted by law, to maintain the Confidential Information in strict confidence for a period of 3 years from the date of termination of this Agreement. Confidential Information shall be identified as confidential immediately upon the University's receipt of such information. The obligations of this paragraph do not apply to information in the public domain or information that is independently known, obtained or discovered by the University, or that is hereafter supplied to the University by a third party without restriction, or that is required to be disclosed by process of law.

5. Ownership of Work Product and Intellectual Property Rights. The raw data collected by the University for the Undersigned per this Agreement will be in the Public Domain. The University shall be the sole owner of all derived and value added data, graphics, reports, consultations and written documentation produced by the University from the raw data collected by the University.

6. Termination. In the event that either party commits a material breach of this Agreement and fails to remedy or cure such breach within thirty (30) days after receipt of written notice thereof from the non-breaching party, the non-breaching party may, at its option and in addition to any other remedies which it may have at law or in equity, terminate this Agreement by sending written notice of termination to the other party. Such termination shall be effective as of the date of its receipt. Additionally, either party may terminate this Agreement for its convenience upon sixty (60) days prior written notice to the other party. Upon any termination, the Undersigned shall promptly pay the University for all services rendered and costs incurred up to and including the effective date of termination.

7. Representations and Warranties. The University represents and warrants that in performing the Services it will not be in breach of any agreement with a third party. The Undersigned also represents and warrants that no third party has any rights in, to, or arising out of, the Work Product rendered pursuant to the performance of the Services. Undersigned agrees to hold University harmless from any loss, damage or expense, including court costs and reasonable attorneys' fees, that University may suffer as a result of a breach or alleged breach of the foregoing warranties or as a result of claims or actions of any kind or nature resulting from the provision of the Services or any use of the Work Product.

8. Mutual Indemnification. To the extent allowed by law, each party agrees that it will be responsible for its own acts and the results thereof and shall not be responsible for the acts of the other party and the results thereof. Each party therefore agrees that it will assume all risk and liability to itself, its agents or employees for any injury to persons or property resulting in any manner from the conduct of its own operations and the operations of its agents or employees under this Agreement, and for any loss, cost, or damage caused thereby during the performance of this Agreement.

9. Notice. Any notice to either party hereunder shall be in writing and shall be served either personally or by registered or certified mail addressed to the following individuals:

To the Undersigned:
Lyndon Vogt
General Manager
Central Platte NRD
215 Kaufman Avenue
Grand Island, NE 68803
Additionally: phone – 308-385-6282, email – vogt@cpnrd.org

To the University:
Dr. Martha Shulski,
Director
Nebraska State Climate Office
University of Nebraska-Lincoln
3310 Holdrege Street
Lincoln, NE 68583
Additionally: phone – 402-472-6711, email – mshulski3@unl.edu

10. Assignment. This Agreement is non-assignable and non-transferrable. Any attempt by either party to assign its obligations hereunder shall be void.

11. Amendment. This Agreement constitutes the entire understanding between the Undersigned and the University with respect to the subject matter hereof and may not be amended except by an agreement in writing signed by the Undersigned and the University.

12. Governing Law and Forum. This Agreement shall be governed by the laws of the State of Nebraska. Any legal actions brought by either party hereunder shall be in the District Court of Lancaster County, Nebraska.

13. Debarment List. No contract shall be executed with the Undersigned if they are listed on the General Services Administration's List of Parties Excluded from Federal Procurement or Nonprocurement Programs in accordance with Executive Orders 12549 and 12689, "Debarment and Suspension," (the "Debarment List"). For contracts which in the aggregate exceed $25,000, the Undersigned specifically warrants and represents that it is not included on the Debarment List. The Undersigned further agrees that should it be included on the Debarment List at the time the contract is proposed, or at any time during which the University performs its contractual obligations pursuant to the contract, such listing shall be considered a material breach of the contract between the University and the Undersigned.

14. Pursuant to Nebraska's Taxpayer Transparency Act (Neb. Rev. Stat. §84-602.01), as may be amended), as of January 1, 2014, the University of Nebraska is required to provide the Nebraska Department of Administrative Services with a copy of each contract that is a basis for an expenditure of state funds, including any amendments and documents incorporated by reference in the contract. Copies of all such contracts and documents will be published by the Nebraska Department of Administrative Services at www.nebraskaspending.gov. It shall be the sole responsibility of the Undersigned to notify the University of any requested redactions to such contracts and documents under Neb. Rev. Stat. 84-712.05(3) at the time of execution.

15. Vietnam Era Veterans' Readjustment Assistance Act (VEVRAA). If applicable, the Undersigned shall abide by the requirements of 41 CFR 60-300.5(a). This regulation prohibits discrimination against qualified protected veterans, and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans.

16. Section 503. If applicable, the Undersigned shall abide by the requirements of 41 CFR 60-741.5(a). This regulation prohibits discrimination against qualified individuals on the basis of disability, and requires affirmative action by covered prime contractors to employ and advance in employment qualified individuals with disabilities.

IN WITNESS WHEREOF, the authorized representatives of the parties have executed this Agreement as of this _____ day of _____, 20____.

Full Legal Name of the Undersigned

Signature: Lyndon Vogt **Date:** 3/11/2016

Printed Name: Lyndon Vogt

Title & Entity: General Manager, Central Platte NRD

University of Nebraska-Lincoln Department Head

Signature: Martha D. Shulski **Date:** 3/14/2016

Printed Name: Martha D. Shulski

Title: Director, Nebraska State Climate Office

The Board of Regents of the University of Nebraska (the University)

Signature: A. Brannigan **Date:** 3-16-16

Printed Name: Amber Brannigan

Title: Interim Director of Procurement

University of Nebraska-Lincoln EXHIBIT A

Section 1 – Description of Services:

1.1. Station Definition and Location. The University has provided materials, instruments, and equipment for the purpose of monitoring environmental parameters as described in subsection **1.6.** as part of the greater Nebraska Mesonet ("Mesonet"). The geographical points of observation will be known as the **Central City Airport, Gothenburg, Grand Island, Kearney, Lexington**, and **Shelton** Nebraska Mesonet Stations ("Stations"), and are located at approximately latitude 41.1126326°N, longitude -98.048237°E; latitude 40.9518333°N, longitude -100.19425°E; latitude 40.8880278°N, longitude -98.5118611°E; latitude 40.718°N, longitude -99.0147222°E; latitude 40.76707°N, longitude -99.74099°E; and latitude 40.7493889°N, longitude -98.7595278°E respectively.

1.2. Landowner Agreement. The Undersigned, if not the landowner, is responsible for obtaining a Memorandum of Understanding ("MOU") with the landowner(s) for the property where the Station(s) will be installed. Any MOU will be included and become part of this Agreement.

1.3. Ownership of Station Materials. The University will maintain ownership of all materials, instruments, and equipment used to construct the Station that the University has provided, and will remove all said materials, instruments, and equipment at the termination of this Agreement. The Undersigned will maintain ownership of all materials, instruments, and equipment that the Undersigned provided to secure and/or protect the Station.

1.4. Removal upon Termination. The University has 60 days from date of Agreement termination to remove all University owned materials and equipment, if termination occurs between the dates of 1 March and 31 August. If termination occurs between and including the dates of 1 September and 28/29 February, the University has until the next April 30th following the termination to remove all University owned materials and equipment.

1.5. Station Access. The Undersign will provide right-of-way and/or permission to access the Station for maintenance and inspection to the University at a minimum of once per year, including up through the removal of University property following termination. The University may need to visit the location unannounced for the purpose of emergency inspection and repair. The University will make good faith effort to notify Undersigned of periodic inspection and maintenance visits.

1.6. Station Composition. The monitoring configuration at the Station will include initially, for Gothenburg, Grand Island, Kearney, Lexington, and Shelton:

Height, respective to surface	Base variable measured
-100cm	soil moisture under vegetation
-50cm	soil moisture under vegetation
-25cm	soil moisture under vegetation
-10cm	soil moisture under vegetation
-10cm	soil temperature under bare ground
1m	liquid warm season precipitation
1.5m	barometric pressure
2m	air temperature
2m	air humidity
2.5m	incoming shortwave solar radiation
3m	wind speed
3m	wind direction

The initial monitoring configuration for Central City Airport:

Height, respective to surface	Base variable measured
-100cm	soil moisture and temperature under vegetation
-50cm	soil moisture and temperature under vegetation
-20cm	soil moisture and temperature under vegetation
-10cm	soil moisture and temperature under vegetation
-5cm	soil moisture and temperature under vegetation
-10cm	soil temperature under bare ground
1m	liquid warm season precipitation
1.5m	barometric pressure
2m	air temperature
2m	air humidity
2.5m	incoming shortwave solar radiation
3m	wind speed
3m	wind direction

The University may change the Station configuration at any time.

1.7. Technical Contacts. The University will notify Undersigned Technical Contact of any Station configuration changes within 60 days of any change. Any changes in Station location, Station configuration, or other day-to-day operations will be communicated between the follow individuals:

To the Undersigned:

Duane Woodward
Engineering Hydrologist
Central Platte NRD
215 Kaufman Avenue
Grand Island, NE 68803
Phone: 308-385-6282 (ofc), 308-390-7850 (cell)
Email – woodward@cpnrd.org

To the University:

Glen Roebke,
Mesonet Manager
Nebraska State Climate Office
University of Nebraska-Lincoln
3310 Holdrege Street
Lincoln, NE 68583
Phone: 402-472-6704
Email: groebke2@unl.edu

1.8. Data Collection. The University will install, implement, or otherwise contract at the University's expense all communication devices required for the collection of data from the Station. This includes recurring communication fees and service charges.

1.9. Data and Product Access by Undersigned. The University will make data collected from the Weather Monitoring Area(s) defined in Exhibit A, along with all other NSCO Nebraska Mesonet data, available via electronic interface on the Internet. The Undersigned will have unlimited access to raw and derived data values through a NSCO Web interface. Unlimited data refers to both temporal and spatial relationships of any data in the NSCO database. The Undersigned will also have access to specific NSCO products derived from non-Nebraska Mesonet base data, including but not exclusive to RADAR estimated precipitation, satellite estimated precipitation, COOP, FAA/NWS observations, and forecast products specific to Nebraska interests. The University will provide direct access to NSCO developer resources for recommended new products, adaptations of existing products, and reduced rate consulting.

1.10. Maintenance, Upgrades, and Repairs. The University will perform regularly scheduled maintenance and calibration of equipment assembled as the Station, and will perform upgrades and repairs as needed to maintain the Station as an official meteorological observation unit. All costs of repairs, upgrades, and maintenance will be covered by the University, except in the case of negligence, abuse, or accidental damage or destruction on the part of the Undersigned, at which time the University will perform repairs and invoice the Undersigned for materials, instruments, and/or equipment required to return the Station to operational status.

Section 2 – Payment:

2.1. Schedule of Invoice and Payment. The University will issue an invoice for fees as indicated in subsection no later than 1 May of each year, Net 60, with payment made to the University no later than 1 July of the same year.

2.2. Fee Schedule.

Invoice Date	Payment Due Date	Amount Due
1 May 2016	1 July 2016	$12000.00
1 May 2017	1 July 2017	$15600.00
1 May 2018	1 July 2018	$15600.00
1 May 2019	1 July 2019	$15600.00
1 May 2020	1 July 2020	$15600.00

NEBRASKA

Good Life. Great Roots.

DEPARTMENT OF AGRICULTURE

June 1, 2017

Martha Shulski, Ph.D., Director
Nebraska State Climate Office
University of Nebraska – Lincoln
711 Hardin Hall
3310 Holdrege Street
Lincoln, NE 68583-0931

Dear Dr. Shulski:

The Nebraska Department of Agriculture is writing in support of the Nebraska State Climate Office to receive Federal funding to support the Nebraska Mesonet network. The Nebraska Mesonet weather observation network provides vital information for Nebraska's farmers and ranchers.

This information is easily accessible to Nebraska producers across the state and includes:

- Soil temperatures which help determine the appropriate time to plant various crops to assure proper germination.
- Wind speed and direction that aid in deciding when and where to apply herbicides and pesticides.
- Rainfall amounts which can assist in irrigation scheduling.
- Cattle comfort indexes that indicate when temperatures and humidity could be harmful to pastured animals without an adequate water supply.
- Wind chill temperatures that take into account cold temps and wind speeds to indicate possible safety issues for humans and animals that are outdoors.

Access to the non-biased climatic information provided by the Nebraska Mesonet network helps farmers and ranchers make management decisions that help them tend to the land, care for livestock and protect our natural resources. Support of the Nebraska Mesonet network is a needed investment to Nebraska's number one industry – agriculture.

Thank you.

Sincerely,

Greg Ibach, Director

Greg Ibach, Director
Department of Agriculture
P.O. Box 94947
301 Centennial Mall South
Lincoln, Nebraska 68509
OFFICE 402-471-2341 FAX 402-471-6876
nda.nebraska.gov

Nebraska Public Power District
"Always there when you need us"

Patrick L. Pope
President & CEO
(402) 563-5029 / 5145 fax
Email: plpope@nppd.com

June 13, 2017

Martha Shulski, Ph.D.
Director and Associate Professor
Nebraska State Climate Office
University of Nebraska - Lincoln
153C Hardin Hall
3310 Holdrege Street
Lincoln NE 68583-0931

Re: Letter of Support for the Nebraska Mesonet at the State Climate Office, University of Nebraska - Lincoln

Dear Dr. Shulski,

We at the Nebraska Public Power District (NPPD) are pleased to offer our support for the Nebraska Mesonet at the State Climate Office, University of Nebraska - Lincoln. Your weather monitoring program provides vital, high-quality weather data for locations across the state with professional and timely services. As you may know, NPPD is Nebraska's largest electric utility, with a chartered territory including all or parts of 86 of Nebraska's 93 counties. NPPD's mission is to safely generate and deliver reliable, low cost, sustainable energy and provide outstanding customer service to our customers. Clearly the geographic footprint of the Nebraska Mesonet is well aligned with our service territory and the needs of our customers.

Our organization partners with the University of Nebraska - Lincoln in supporting the Nebraska Center for Energy Sciences Research. This Center, chartered in 2006, provides seed grants for energy sciences research. Your recently funded project on improving wind forecasting by incorporating Nebraska Mesonet data into the weather models can become invaluable for our daily operations. Accurate wind forecasts are critical to us for cost-effective decisions regarding daily renewable generation forecasts. Having accurate wind forecasts are also important for electric grid reliability.

Understanding energy needs and demands during summer irrigation season is also critical to the District. Obviously, crop water use is highly weather dependent. Your detailed observations and data products, such as evapotranspiration, that feed into crop water use models inform irrigation decisions and impact energy requirements. Furthermore, your regular weather outlook consultations provided to us over the years are never more important as we directly use this information in our decision-making on energy demand and resource allocation.

The weather data, products, services, and research capabilities available from the Nebraska Mesonet cannot be found anywhere else. We urge your funders to take into consideration the value our operations receive from your excellent network. Nebraska is fortunate to have such a high quality suite of weather observations readily available through the State Climate Office at the University of Nebraska – Lincoln. If I can provide any further clarification, please don't hesitate to reach Mr. Alan L. Dostal by phone (402 750 8206) or by email (aldosta@nppd.com).

Sincerely,

Patrick L. Pope
President and CEO

cc: Alan L. Dostal – NPPD
John H. Swanson – NPPD
Ronald F. Thompson - NPPD
Michael A. Nastasi, Ph.D - Director, Nebraska Center for Energy Sciences Research

Nebraska Indian Community College
Math & Science Department
P.O. Box428
Macy, NE 68039
Phone (402) 241-5937
Fax (402) 857-2543

30 June 2017

Martha Shulski, Ph.D.
Director and Associate Professor
Nebraska State Climate Office
University of Nebraska - Lincoln
153C Hardin Hall
3310 Holdrege Street
Lincoln, NE 68583-0931

Dear Dr. Shulski,

The Nebraska Indian Community College is writing to offer full support of your weather monitoring program - the **Nebraska Mesonet** - at the Nebraska State Climate Office, University of Nebraska - Lincoln. As you know, we are an accredited institution of higher learning established in 1973. We operate three campuses in northeast Nebraska – Macy, South Sioux City, and Santee.

Weather monitoring is a key element to our curriculum here at the NICC. We integrate weather and climate data and information into much of our coursework and it greatly enhances our student learning. The professional expertise of your Nebraska Mesonet program has been invaluable to our campus weather monitoring. Without your assistance in helping set up stations, we would not have quality data to utilize in our educational programming. Furthermore, we often compare our observations with those of your network. We value the quality data that your program offers that we cannot get in any other network.

The suite of services available from your program is a vital component to NICC curriculum and research. The unique expertise of your faculty and staff, the high quality and timely weather observations, and your research capabilities are highly beneficial to student development at the NICC. I am pleased that Nebraska has such an offering through the State Climate Office at the University of Nebraska – Lincoln. We urge your funders to consider the negative impact to NICC if the Mesonet is not funded at a sustainable level. If I can provide any further clarification, please don't hesitate to contact me by phone (402) 241-5937 or email hmiller@thenicc.edu .

Sincerely,

Hank Miller, Math/Science Division Head,
Nebraska Indian Community College

CENTRAL PLATTE
NATURAL RESOURCES DISTRICT
215 Kaufman Avenue
Grand Island, Nebraska 68803
(308) 385-6282 FAX (308) 385-6285
www.cpnrd.org

24 July 2017

Martha Shulski, Ph.D.
Director and Associate Professor
Nebraska State Climate Office
University of Nebraska - Lincoln
153C Hardin Hall
3310 Holdrege Street
Lincoln, NE 68583-0931

Dear Dr. Shulski,

The Central Platte Natural Resource District is pleased to provide this letter in strong support of the Nebraska Mesonet – the statewide automated weather network operated by the Nebraska State Climate Office at the University of Nebraska - Lincoln. As you are aware, we sponsor the operation of six weather stations in our District (Central City, Gothenburg, Grand Island, Kearney, Lexington, and Shelton). We began our first weather station sponsorship in 1997 and have a long-standing and positive relationship with your organization. The data, and associated data products, are invaluable for our operations and ensuring sustainable water management. Our District encompasses a rich agricultural area of the state with viable and successful production strongly tied to irrigation use. There are 18,000 wells and 1,028,055 irrigated acres within our management area.

This weather information is imperative for us to accurately track crop water use and manage irrigation efficiently and effectively. Specifically, we utilize the data in the following ways provide inputs to Crop Water Use models that compute month pumping and groundwater recharge volumes for groundwater aquifer storage analysis. The potential ET data is also utilized by producers to estimate their crops use of water during the week and schedule irrigation applications.

Furthermore, information is used by University researchers for developing daily evapotranspiration data spatially across the CPNRD using satellite information and the METRIC process.

High quality and timely weather data operations from the Nebraska Mesonet are paramount to our NRD operations. Successful and sustainable water management is a function of these data and products. We urge your funders to consider potential negative impacts to agricultural production in Nebraska should Mesonet operations be compromised. I would be pleased to

provide further input as needed and can be reached by phone (308-385-6282) or email (woodward@cpnrd.org) anytime.

With best regards,

Duane Woodward

Duane Woodward
Engineering Hydrologist
Central Platte NRD

CENTRAL
Nebraska Public Power and Irrigation District

415 Lincoln St.
P.O. Box 740
Holdrege, NE 68949-0740

Phone: (308) 995-8601
Fax: (308) 995-5705
Web: www.cnppid.com

1 August, 2017

Martha Shulski, Ph.D.
Director and Associate Professor
Nebraska State Climate Office
University of Nebraska - Lincoln
153C Hardin Hall
3310 Holdrege Street
Lincoln, NE 68583-0931

Dear Dr. Shulski,

The Central Nebraska Public Power and Irrigation District (CNPPID) is writing to enthusiastically support the Nebraska Mesonet, the automated weather network run by the Nebraska State Climate Office at the University of Nebraska - Lincoln. As you are aware, we sponsor three stations in the network in three adjoining counties along the Platte River. This long-standing and high quality network offers data, products, and associated weather and climate services not obtainable anywhere else.

Central has regional interest in snowpack, precipitation, daily crop water use, forecasting and historic data from the headwaters of the North and South Platte Rivers in CO, through WY and to the Big Bend Reach of the Platte River near Chapman, NE. As I am sure you understand, daily crop water use data in this major agricultural state is relied on heavily by our producers and by producers statewide; we must have a reliable data source for weather and crop water use.

Furthermore, we have come to rely on Al Dutcher's forecasting ability as it has proven to be extremely accurate time and time again. Al is informed by the Mesonet data and his forecasts are an important piece of information in our determinations of water supply for hydropower production and allocating water for irrigation demand to crop production acres having access to our storage water in Lake McConaughy.

Nebraska is very fortunate to have a weather observation network of this quality. The history of data, associated products, and availability of support staff is second to none. We urge continuation of funding for this valuable resource. I can be reached at any time ((308) 955-3550) should you need further clarification from Central.

Sincerely,

Marcia L. Trompke
Conservation Director/Farm Manager